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Art. VIII.—*Two New Australian Fossil King-Crabs.*

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(With Plate XIV.)

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The two fossil forms belonging to the orders Xiphosura and Synxiphosura, are herewith described as new to Australia. One of these is a new generic type, *Pincombella*, of Permian age, and the other a new species of the Silurian genus *Hemiaspis*. The species from the Permian (Belmont beds) of New South Wales, viz., *Pincombella belmontensis*, is a small, but interesting predecessor of the living King-Crabs, and allied to the Carboniferous *Belinurus*. This specimen was left with me at the National Museum on the 15th January, 1924, by the late Mr. T. H. Pincombe, who expressed his desire that I should describe it. This description has unfortunately been delayed until now, owing to a lack of some necessary literature dealing with this group.

The second fossil specimen belongs to the Synxiphosura, an order which contains only Silurian genera, with the one Cambrian exception (*Aglaspis*). The genus to which this second specimen belongs is *Hemiaspis*, of which four species are known from the Silurian of Scotland.

The present species, *Hemiaspis tunnecliffei*, was found by Master T. Tunnecliffe, and I am indebted to Prof. Skeats for kindly handing it to me for description.

Phylum ARTHROPODA.

Class ARACHNIDA.

Sub-Class MEROSTOMATA.

Order XIPHOSURA.

Family BELINURIDAE.

Genus **Pincombella**, gen. nov.

Description of *Pincombella*, gen. nov. Cephalic shield more roundly ovate than in *Belinurus*, and having the anterior margin spinous instead of evenly rounded; posterior angles terminating in blunt spines, whereas in *Belinurus* they are produced. Abdominal segments spinose, 5, as against 8 in *Belinurus*. Telson long.

PINCOMBELLA BELMONTENSIS, sp. nov.

(Plate XIV, Figs. 1-3.)

Description (based on the ventral aspect).—Carapace with the cephalothorax broadly ovate, narrowing in the abdominal region and terminating in a long spine-like telson. The broadest part is measured across the medium lateral angles of the cephalothorax. Anterior border of cephalothorax bluntly and numerously spinose, thin in texture and with the peripheral region marked out by a definite rust-stained impression. Area of genal angles sub-rounded or bluntly angular. Median line of cephalothorax fairly well defined, with vestiges of basal joints of ambulatory appendages visible; two of the minute chelate claws are seen protruding across the upper left ventral margin. Opercular plates stout, oblong and divergent posteriorly; colour of a rich plum-brown, and with the surfaces finely granular. Five abdominal segments visible, the anterior transversely quadrate, the 2nd, 3rd, 4th low and narrow, the 5th posterior quadrate and bispinose behind; telson long, slender and acuminate, about five times the length of the last posterior segment.

Dimensions.—Length of carapace without spine, 11 mm. Length of cephalothorax, 8 mm. Width of cephalothorax, 13 mm. Spine, 5 mm. Total length, 16 mm.

Affinities.—The relationships of the present genus *Pincombella* lie with the limuloids rather than with the Synxiphosura (*Hemiaspis*), for the abdominal segments are greatly reduced in the present fossil, amounting to only 5 narrow divisions. It partakes somewhat of the characters seen in *Palaeolimulus*, Dunbar (C. O. Dunbar, 1923, p. 443), of the Permian of Kansas, but the abdominal segments in that genus are more numerous and rigid, whilst the cephalothoracic shield is produced posteriorly into sharp genal spines.

The sub-ovate shape of the cephalic shield resembles *Prestwichia*, where, however, the abdominal segments number eight. Possibly the relationship of *Pincombella* is nearest to *Belinurus*, of the Upper Old Red Sandstone and Coal measures of Great Britain and Northern France, another form of which genus is also found in the coal measures of Illinois, U.S.A. In that genus the carapace is lower, with prominent genal angles. The opercular plates are of much the same character and disposition, whilst the abdominal segments (8 in *Belinurus* and 5 in *Pincombella*) are similarly spinose. Both have also a very long and slender telson.

The true form of *Limulus* first appears in the Trias (Bunter Sandstone of the Vosges), so that the present Permian genus is an additional and important link with the earlier, Carboniferous limuloids.

Locality and Horizon.—Belmont Fossil Bed, 2 miles on Newcastle side of Belmont, N.S.W. Collected by T. H. Pincombe, Esq., and presented to the National Museum, 15th January, 1924.

Order SYNXIPHOSURA.

Sub-Order BUNODOMORPHA.

Family HEMIASPIDAE.

Genus **Hemiaspis** H. Woodward.

HEMIASPIS TUNNECLIFFEI, sp. nov.

(Plate XIV, Figs. 4, 5.)

Description.—Head-shield low and probably broad when complete; anterior border arcuate, marked with radiating lines. Glabella obscurely subquadrate. Thoracic segments low and narrow, probably numbering six in complete carapace, with marginal spine on each extremity. Median axis rounded, lobed on each segment of thorax. Abdominal somites contracted, probably subquadrate. Telson wanting.

Dimensions.—Length from anterior margin of head-shield to abdominal extremity, 50 mm. Length of head-shield, 15 mm.; width, circ. 36 mm. Length of thoracic series, 27 mm. Length of abdominal somites, 8 mm. The specimen is crushed along the median axis. A carbonaceous stain on the surface of the fossil with the exception of the anterior rim of the head-shield emphasises the surface structure to some extent, by defining the sutures and rendering the lateral margins more distinct.

Affinities.—Apparently the first recorded member of the family *Hemiaspidae* in Australia, this interesting fossil shows the nearest relationship to *Hemiaspis limuloides* H. Woodward (1865, p. 490, pl. xiv, fig. *7a-c*) of the Silurian (Lower Ludlow) Leintwardine, Shropshire, England.

Locality and Age.—Road cutting, Studley Park, Kew, Melbourne, Victoria. Silurian. (Melbournian). Found by Master T. Tunnecliffe, Fitzroy, Melbourne. Type in museum of Geology School, Melbourne University. Reg. No. 1801.

Bibliography.

DUNBAR, C. O., 1923. Kansas Permian Insects, Part 2. Palaeolimulus, a New Genus of Palaeozoic Xiphosura, with notes on other Genera. *American Journ. Sci.* Ser. 5, v, No. 30, pp. 443-454, pl. ii.

WOODWARD, H., 1865. On a New Genus of Eurypterida from the Lower Ludlow Rock of Leintwardine, Shropshire. *Quart. Journ. Geol. Soc.* xxi, pp. 490-492, pl. xiv.

Explanation of Plate XIV.

Fig. 1.—*Pincombella belmontensis*, gen. et sp. nov. Photograph of carapace, ventral aspect. Permian. Belmont, near Newcastle, New South Wales. ×1½.

Fig. 2.—Ditto. Restored outline of fossil. ×2½.

Fig. 3.—Ditto. Enlarged outline of portion of carapace. ×6½.

Fig. 4.—*Hemiaspis tunnecliffei*, sp. nov. Photograph of carapace. Probably dorsal aspect. Silurian. Studley Park, Kew, Melbourne. × circ. 1½.

Fig. 5.—Ditto. Restoration of fossil, circ. nat. size.